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(54) **Wiring box with shielded water outlet**

(57) A wire box including a main box having an outer surface with a water outlet therein. A wall is provided around the periphery of the outlet and projects outwardly from the surface in a direction substantially perpendicular thereto. There is a closure on the end of the wall furthest from the main box. There is at least one opening

in the wall which communicates between the outlet and the exterior of the box. It is more desirable if there is a protective rib adjacent the opening and spaced apart therefrom a distance sufficient to allow water to run out of the opening. The form of the closure may be widely varied so that there is no direct path into and out of the main box for water to follow.

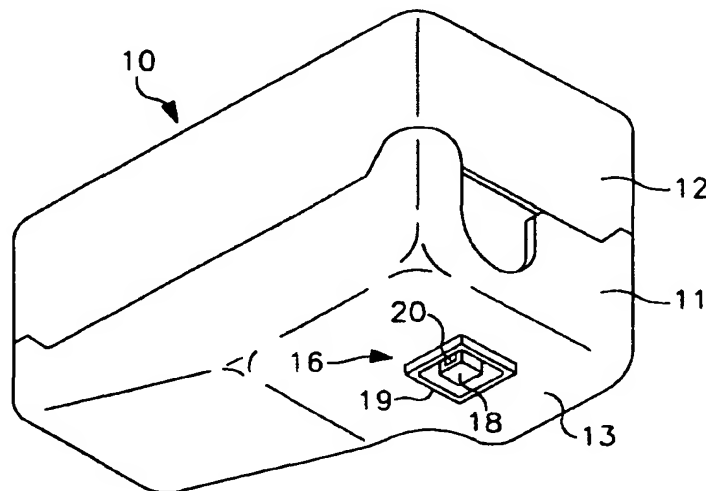


FIG. 1

Description

[0001] The present invention is directed to a wiring box, particularly for use in automobiles, which has provision for preventing water from entering and, at the same time, allowing water within to drain out.

BACKGROUND OF THE INVENTION

[0002] Typical wiring boxes of the prior art are shown in Figures 18 and 19. Wiring boxes 60 and 65 are used to connect various electrical elements, particularly in a vehicle such as an automobile. Covers 62 are provided on main boxes 61 and 66, respectively, for prevention of water seepage. However, it is recognized that some water will inevitably enter the box and, therefore, wiring box 60 (Figure 18) has water outlet 63 in its bottom surface. Alternatively, in Figure 19, wall 68 is provided within main box 61 just within water outlet 67.

[0003] However, the foregoing wiring boxes have certain serious deficiencies. Water can enter the boxes through the water outlets, especially when the vehicle is being washed. Moreover, as can be seen in Figure 19, wall 68 is located inside main box 66. As a result, it reduces the space available and can interfere with and damage the wiring therein.

SUMMARY OF THE INVENTION

[0004] It is, therefore, an object of the present invention to provide improved waterproofing by minimizing the opportunity for water from the outside to enter the box and, at the same time, to prevent internal wires from being damaged.

[0005] The present invention includes a wire box comprising a main box having an outer surface with a water outlet therein. There is a wall adjacent the periphery of the outlet which projects in a direction away from the surface. On the end of the wall farthest from the main box is a closure which is thereby spaced apart from the main box. At least one opening is provided in the wall which communicates with the outlet and the exterior of the main box.

[0006] Protective ribs are located near each of the openings and spaced apart therefrom in a direction parallel to the surface. Advantageously, the ribs can surround the entire wall. Also, a plurality of openings may be provided in the wall, each communicating with the outlet and the exterior of the box. There is a protective rib adjacent each such opening. In a particularly preferred form of the device, there are two openings, diametrically opposite each other and ribs corresponding thereto.

[0007] Usefully, the surface is at the bottom of the main box and a section thereof is slanted in the direction of the outlet. This facilitates the draining of water out of the box. Alternatively, a central portion of the closure is raised upward so that it is higher than at least a portion

of the perimeter of the closure. Thus, the closure slopes toward the opening(s).

[0008] It is of particular value if the height of the rib(s) perpendicular to the surface is greater than the width of the opening in the same direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In the accompanying drawings, constituting a part hereof, and in which like reference characters indicate like parts,

Figure 1 is a perspective view showing the wiring box from the bottom;

Figure 2 is an enlarged bottom view of the rib, wall, and closure;

Figure 3 is a cross section along the line 3-3 of Figure 2;

Figure 4 is a cross section along the line 4-4 of figure 2;

Figure 5 is a view, similar to that of Figure 2, of a preferred form of the invention;

Figure 6 is a cross section along line 6-6 of Figure 5;

Figure 7 is a cross section, similar to that of Figure 6, showing the slanted bottom surface;

Figure 8 is a cross section, similar to that of Figure 4, of the device of Figure 7;

Figure 9 is a cross section, similar to that of Figure 8, showing the closure with an elevated central portion;

Figure 10 is a section perpendicular to that of Figure 9;

Figure 11 is a cross section, similar to that of Figure 2, of a device having only a single opening;

Figure 12 is a perspective view wherein the closure is cruciform in shape;

Figure 13 is a view, similar to that of Figure 12, wherein the cruciform closure is surrounded by a rib;

Figure 14 is a view, similar to that of Figure 13, wherein the closure has been modified;

Figure 15 is a cross section along line 15-15 of Fig-

- ure 14;
- Figure 16 is a cross section along line 16-16 of Figure 14;
- Figure 17 is a cross section along line 17-17 of Figure 14;
- Figure 18 is a partial section showing a wiring box of the prior art; and
- Figure 19 is a view, similar to that of Figure 12, of another prior art wiring box.

DETAILED DESCRIPTION OF THE INVENTION

[0010] As shown, for example, in Figures 1 to 4, wiring box 10 of the present invention comprises main box 11 and a cover 12. Integral with main box 11 are wall 17 and closure 18 which form a cavity. Wall 17 symmetrically surrounds water outlet 14 and closure 18 is separated by a distance therefrom. A pair of openings 20, communicating between water outlet 14 and the exterior of main box 11, is formed in wall 17. Rib 19, preferably four-sided, projects from outer surface 13 of main box 11. Preferably, height h1 of rib 14 is greater than height h2 of openings 20.

[0011] The wiring box in accordance with the present invention permits water entering main box 11 (such as during a car wash) to drain by passing through water outlet 14 and openings 20. The protection formed by walls 17 and closure 18 serve to make it very difficult for water below outlet 11 to pass through the outlet and enter main box 11. Moreover, rib 19 impedes water droplets attempting to enter water outlet 14 from below the outlet at an angle thereto.

[0012] In Figures 5 and 6, water outlet 14 in outer surface 13, wall 17 with openings 20, and closure 18 are all as shown in Figure 2. Ribs 19 are provided only adjacent openings 20 rather than completely surrounding water outlet 14.

[0013] In Figures 7 and 8, slanted surface 27 directs any water to water outlet 14 and through openings 20. Closure 18 prevents entry of water from directly below and ribs 19 prevent entry of water at an angle. This configuration permits water to drain out of the box more readily. As shown in Figures 9 and 10, closure 18 is designed so that elevated central portion 30 is closer to water outlet 14 than the rest of the closure. This further assists the water to drain out of the box. Figure 11 shows a box of the present invention wherein water outlet 14 in outer surface 13 is provided with closure 18. Wall 17 has only a single opening 20 and rib 19 is located adjacent thereto. On the other side of wall 17, there is no opening and rib 19 adjacent thereto may be omitted if desired.

[0014] As can be best seen in Figure 12, bottom 25 of main box 11 is provided with shielding member 16

wherein closure 45, affixed to supports 44, is in the shape of a cross. This permits water which has entered main box 11 to pass through water outlet 14 and openings 46, thereby draining main box 11.

[0015] In a preferred form of the invention (see Figure 13), rib 19 surrounds water outlet 14 and is spaced apart therefrom. This provides an added measure of protection against water being splashed into main box 11.

[0016] The invention as shown in Figures 14 to 17 includes shielding member 51 which comprises supports 52 and 53, closure 54, and openings 55.

[0017] The present invention possesses a number of advantages over the prior art wiring boxes as shown in Figures 18 and 19. Since closure 18 and wall 17 are disposed outside main box 11, they do not interfere with wires or any other elements within the box. This reduces opportunity for damage during assembly and thereafter. Furthermore, this makes it more difficult for water droplets from directly below to enter the wiring box and hence makes the waterproofing more reliable. If ribs 19 are also provided, this impedes the entry of water even if it comes from below at an angle. If the height of rib 19 is greater than the width of opening 20, it becomes still more difficult for water droplets to enter main box 11. Of course, if only one opening 20 is provided (as in Figure 11), this increases the reliability of the waterproofing and makes it still more difficult for water to enter the box.

[0018] Although a limited number of aspects of the present invention have been expressly disclosed, such modifications as would be apparent to the person of ordinary skill may be made without departing from the scope or spirit thereof. Although water outlets 14 have been shown as being rectangular, it is within the contemplation of the present invention that these openings could be of any shape, including circular and triangular. Moreover, the wiring box may be provided with a plurality of shielding members, rather than the single such member specifically described herein. In essence, it is a feature of the present invention that the openings leading from the water outlet to the exterior of the main box are not directly under the water outlet. In this way, water splashing into the box is either minimized or avoided. It is preferable that the height of the ribs be such that they extend, in a direction perpendicular to the bottom of the box, beyond the openings through which water passes. This adds to the waterproofing ability of the device.

[0019] Although only a limited number of aspects of the present invention have been expressly disclosed, it is, nonetheless, to be broadly construed, and not to be limited except by the character of the claims appended hereto.

Claims

1. A wiring box (10) comprising a main box (11) having an outer surface (13) with a water outlet (14) thereon, a shielding member (16) thereon, said shielding

member comprising a wall (17) at least partly surrounding a periphery of said outlet and projecting in an external direction from said surface, a closure (18) on an end of said wall remote from said main box, whereby said closure is spaced apart from said main box in said external direction, at least one opening (20, 46) in said wall in communication with said outlet and an exterior of said main box.

tions, whereby said supports function as protective ribs.

2. The wiring box of Claim 1 wherein said wall extends around said periphery of said outlet. 5 10
3. The wiring box of Claim 1 comprising at least one protective rib (19) adjacent said opening and spaced apart therefrom in a rib direction parallel to said surface. 15
4. The wiring box of Claim 1 wherein said rib surrounds said wall. 20
5. The wiring box of Claim 1 comprising a plurality of said openings in said wall, each of said openings being in communication with said outlet and said exterior of said main box, one said protective rib being adjacent each of said openings. 25
6. The wiring box of Claim 4 wherein there are two said openings opposite each other.
7. The wiring box of Claim 1 wherein said main box has an inner surface (27) and at its bottom (25), a section of said inner surface being slanted toward said outlet. 30
8. The wiring box of Claim 1 wherein an elevated portion of said closure is closer to said water outlet than at least a part of a perimeter of said closure, thereby forming a slope toward at least one said opening. 35
9. The wiring box of Claim 1 wherein said rib has a first height in said external direction greater than a second height of said opening in said external direction. 40
10. The wiring box of Claim 1 wherein said closure is in the form of a cross, said wall comprising supports (44), each of which extends from said bottom to an end of said cross, whereby said closure, said supports, and said outlet form each said opening. 45
11. The wiring box of Claim 10 comprising a protective rib adjacent each said opening and spaced apart therefrom in a rib direction parallel to said surface. 50
12. The wiring box of Claim 1 wherein said shielding member comprises said wall in the form of supports adjacent said outlet, said closure on ends of said supports and covering said water outlet, said closure having a narrow portion between widened por- 55

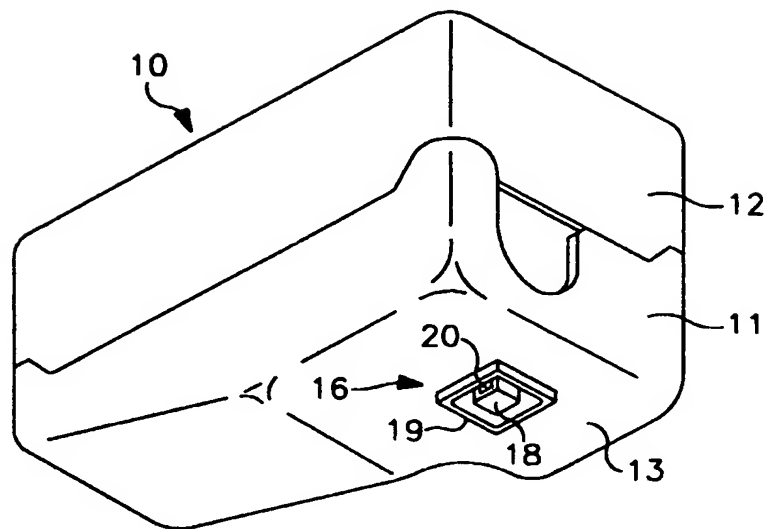


FIG. 1

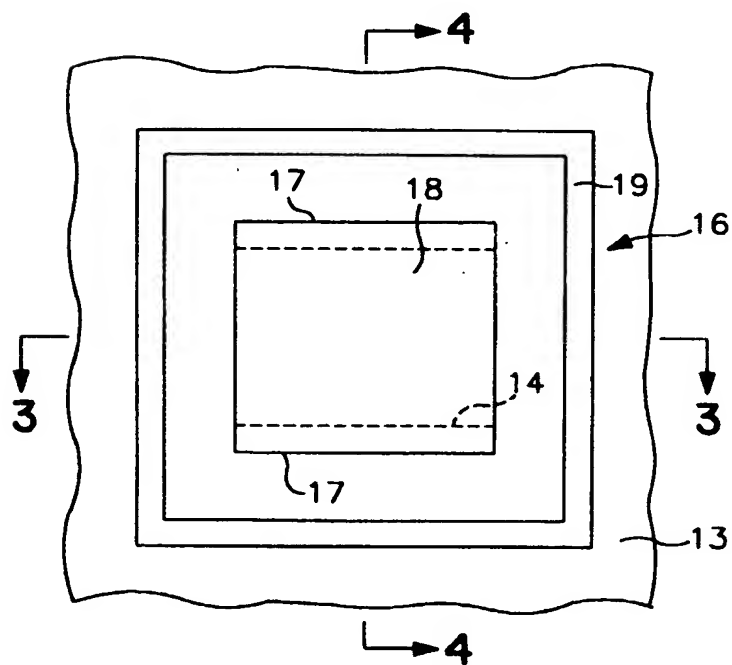


FIG. 2

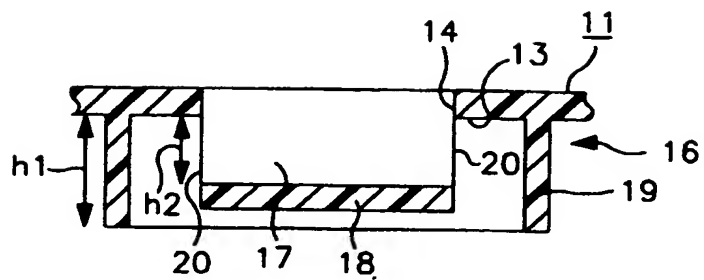


FIG. 3

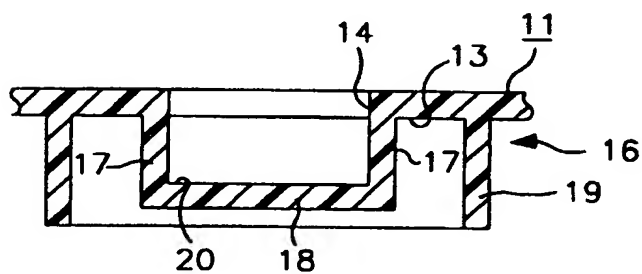


FIG. 4

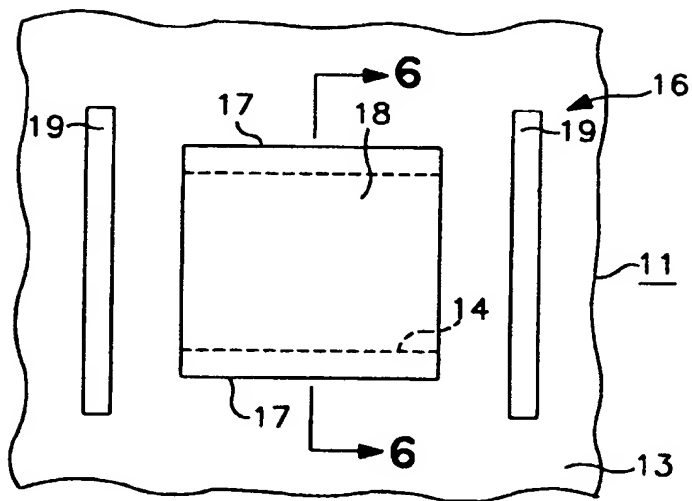


FIG. 5

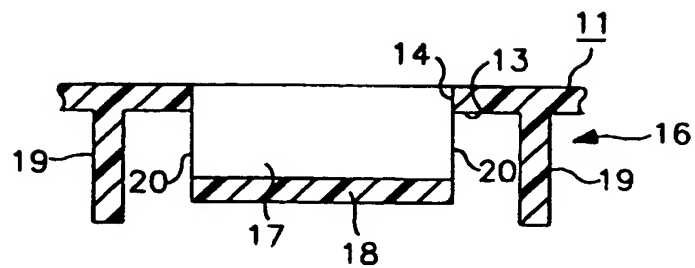


FIG. 6

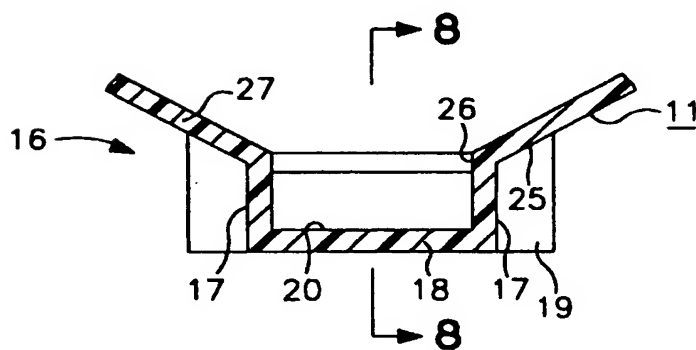


FIG. 7

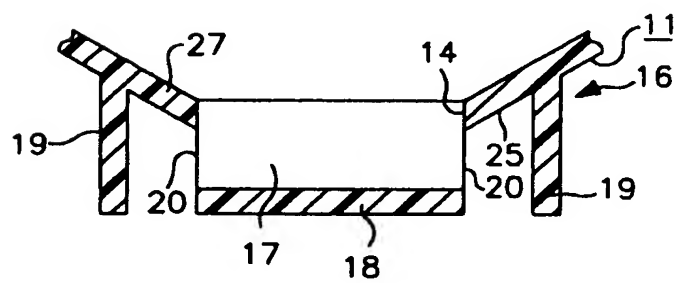


FIG. 8

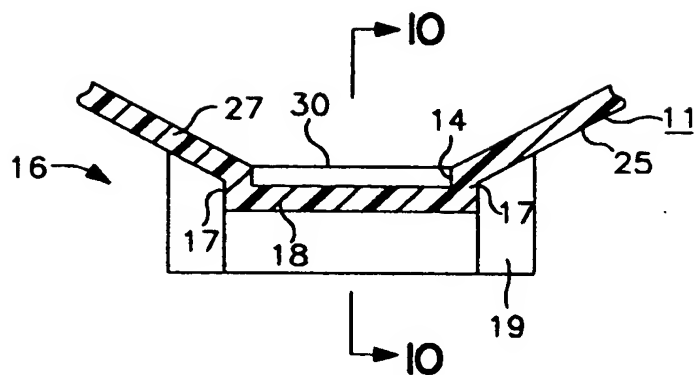


FIG. 9

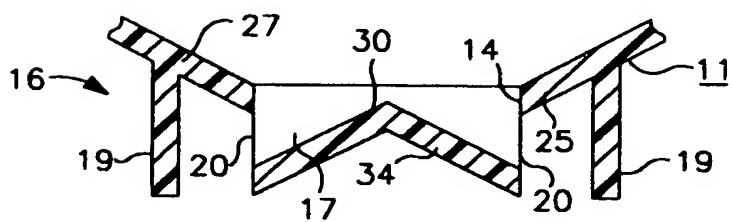


FIG. 10

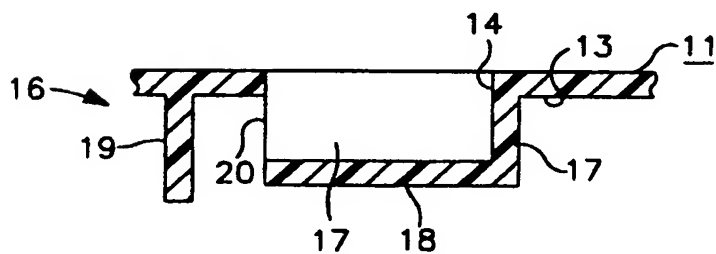


FIG. 11

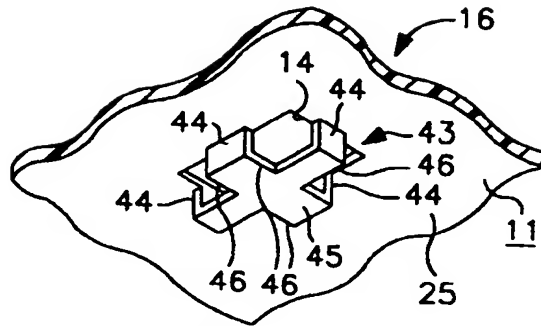


FIG. 12

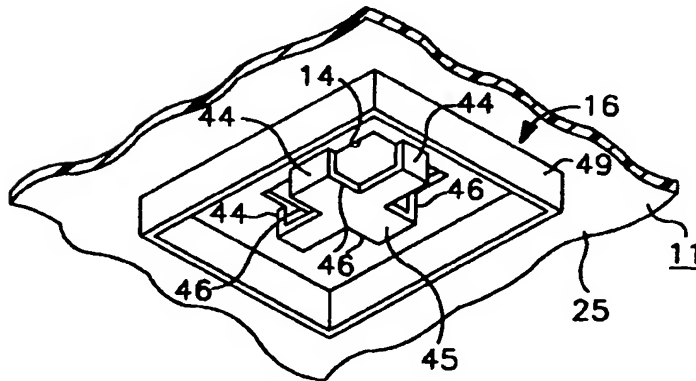


FIG. 13

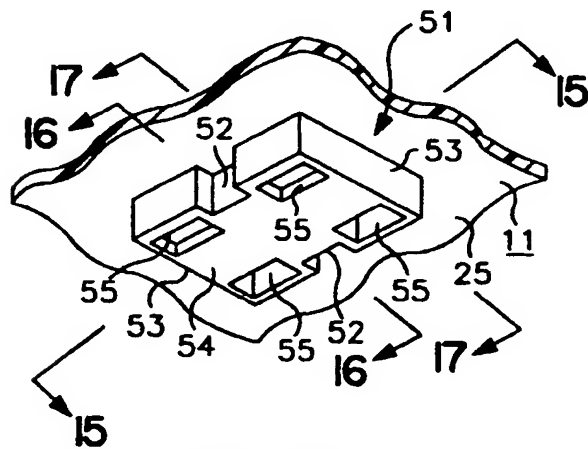


FIG. 14

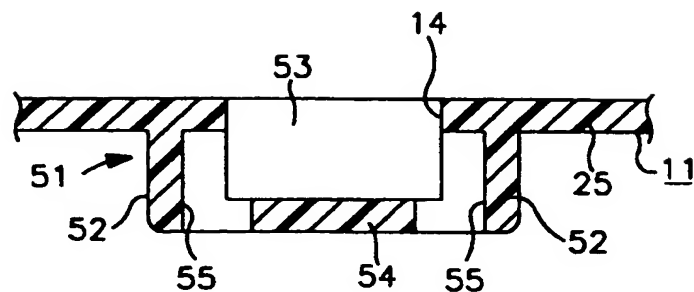


FIG. 15

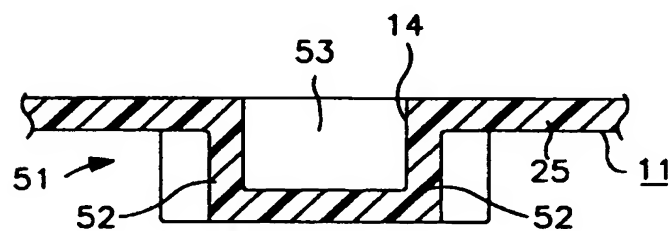


FIG. 16

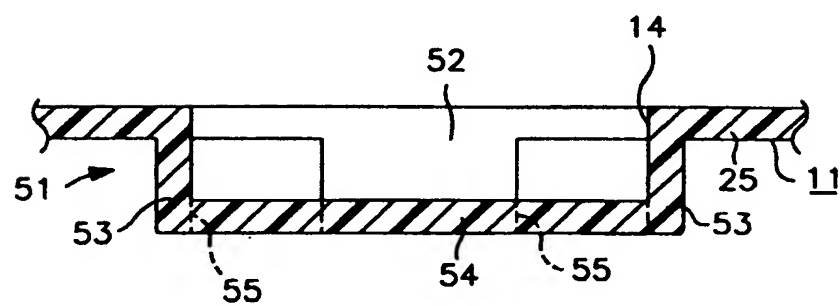


FIG. 17

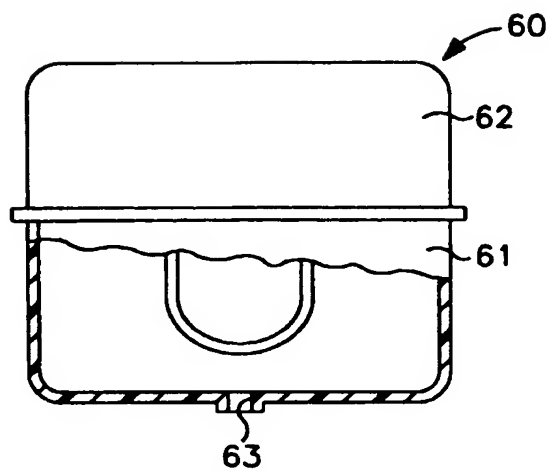


FIG. 18

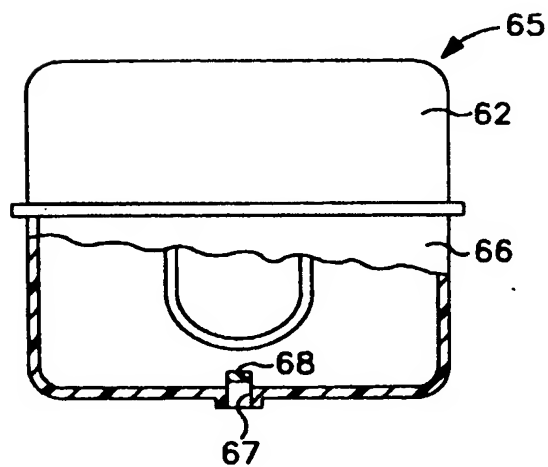


FIG. 19



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 0720

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	PATENT ABSTRACTS OF JAPAN vol. 97, no. 8, 29 August 1997 & JP 09 103017 A (SUMITOMO WIRING SYST LTD), 15 April 1997 * abstract *	1, 2, 7	H02G3/08
X	US 5 159 155 A (NISHIHARA) 27 October 1992 * the whole document *	1-3	
A	PATENT ABSTRACTS OF JAPAN vol. 97, no. 4, 30 April 1997 & JP 08 322124 A (SUMITOM WIRING SYST LTD), 3 December 1996 * abstract *	1	
A	US 5 703 325 A (YAMAGUCHI ET AL.) 30 December 1997 * column 5, line 6 - column 5, line 11; figure 1 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.8)
			H02G H05K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 April 1999	Examiner Bolder, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EP 99 10 0720

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27-04-1999

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